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Conference Abstract

Herbaria as Functional Trait Databases

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Abstract

Although tropical rainforests play an important role in regulating the world's climate, they are at the same time particularly vulnerable to changes in the climate. Intense and prolonged droughts, for instance, can lead to biomass loss which will further accelerate these changes. Especially for tree species it becomes problematic, due to their long lifespan, to quickly adapt to or evade unfavorable climatic conditions affecting the composition of the forest community as a whole and consequently the ecosystem services that the rainforests provide.

A long-term drying trend currently threatens tropical regions worldwide but is especially strong in the central African rainforest, the second-largest rainforest on Earth. The impact of this decrease in precipitation on the vegetation is, however, still largely unknown due to the limited amount of historical eco-climatological data. Fortunately, these kind of data do exist albeit in a poorly accessible (analog) format in herbarium collections.

To investigate if trees show changes in morphology and/or physiology invoked by climatic changes in the last century, the COBECORE team (Congo Basin Eco-Climatological Data Recovery and Valorization") is exploring the usability of herbaria as potential sources of plant leaf functional trait data using established protocols adjusted to dried leaf material. Photosynthesis as well as gas exchange and transpiration are processes regulated by a plant's leaves, and depend on the specific leaf area (SLA) and the number and size of the stomata. The less area the latter structures occupy on the leaf the less the plant will suffer from water losses which increases the resistance to drought of plants.

We explored the recently digitized African Herbarium of the Botanic Garden Meise which contains over 1.2 million African specimens with a very good coverage of the Congo Basin, dating back to 1880. Currently, we obtained average SLA measurements for 833 herbarium specimens from 59 of the most common tree species of central African rainforests. Pictures for stomata counts and size measurements were taken from over one hundred specimens mainly focused on three *Prioria* species, giant tree species (up to 60 metres) currently suffering from overexploitation. The data generated in this project will be valuable to understand some lower-level vegetation responses such as plant water use needed to model and predict long-term climate change impacts on vegetation.

Keywords

climate change, plant functional traits, herbaria, Congo, central African rainforest

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